

### **REMARKS**

The Office Action dated February 17, 2010 has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response thereto.

Claims 37, 48, 49, 65, 71, and 76 have been amended to more particularly point out and distinctly claim the subject matter of the invention. No new matter has been added. Claims 37-50, 52-60, 63-65, and 68-76 are currently pending in the application and are respectfully submitted for consideration.

Claims 37, 48, 49, 55, 65, 71, 73, and 76 were rejected under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the written description requirement. In particular, the Office Action took the position that the specification does not describe a “non-reflective actuator surface” in a manner that conveys to one of ordinary skill in the art that the inventors had possession of the invention at the time the application was filed.

Claims 37, 48, 49, 65, 71, and 76 have been amended to remove the term “non-reflective.” As such, Applicants submit that this rejection is rendered moot and should be withdrawn.

Claims 37-46, 48, 52-60, 63-65, and 68-76 were rejected under 35 U.S.C. §103(a) as being unpatentable over Nading (U.S. Patent No. 6,369,000) in view of Ely (U.S. Patent No. 4,480,182). The Office Action took the position that Nading discloses all of the elements of the claims, with the exception of an actuator surface that is deformable, the portion of the actuator surface has a different refractive index than the gas or fluid,

and the portion of the light guide surface has a higher refractive index than the portion of the actuator surface. The Office Action then cited Ely as allegedly curing these deficiencies in Nading. This rejection is respectfully traversed for at least the reasons discussed below.

Claim 37, upon which claims 38-50, 52-60, 63-64, and 68-70 depend, recites an apparatus including a light guide having a surface to internally reflect a generated light signal from a transmitter to a receiver. The apparatus also includes an actuator having an actuator surface with at least a portion of which is movable between a first position spaced apart from a portion of the light guide surface, with a gas or fluid therebetween, and a second position which is in contact with the portion of the light guide surface. The portion of the light guide surface has a higher refractive index than the portion of the actuator surface, and the portion of the actuator surface has a different refractive index than the gas or fluid. In use the relative refractive index is changed at a contacted portion of the light guide surface, thereby altering the light signal received by the receiver, and the portion of the actuator surface is deformable.

Claim 65, upon which claims 72-75 depend, recites to a method including reflecting a generated light signal off a surface. A relative refractive index between materials on either side of the surface is changed by contacting the surface with a deformable actuator, which has a lower refractive index than the surface, thereby altering the reflected light signal. The reflected light signal is received and used to control a position of an element.

Claim 71 recites an apparatus including light guiding means for guiding light, the light guiding means having a surface for internally reflecting a generated light signal from transmitting means to receiving means. The apparatus also includes actuating means for actuating, the actuating means having a deformable surface with at least a portion of which is movable between a first position spaced apart from a portion of a light guide surface, with a gas or fluid therebetween, and a second position in contact with the portion of the light guide surface. The portion of the light guide surface has a higher refractive index than the portion of the deformable actuator surface, and the portion of the deformable actuator surface has a different refractive index than the gas or fluid. In use the relative refractive index is changed at the contacted portion of the light guide surface, thereby altering the light signal received by the receiving means.

Claim 76 recites an apparatus including a light guide having a surface to internally reflect a generated light signal from a transmitter to a receiver. The light guide is configured to be contacted at the surface by a deformable actuator having a lower refractive index than the surface. In use, a relative refractive index is changed at the surface when contacted by the deformable actuator, thereby altering the light signal received by the receiver.

As will be discussed below, Applicants respectfully assert that the combination of Nading and Ely fails to disclose or suggest all of the features of any of the presently pending claims.

Nading describes a method and an apparatus for use with a keypad for an electronic device including at least one plunger associated with a key. The plunger is moveable between a first position and a second position relative to the electronic device. The apparatus is an electrical assembly including a light guide, and at least one electrical component carried by the light guide and positioned to underlie the key. Positioning to underlie the key is for at least one of a) illuminating the key, and b) changing between a first electrical state and a second electrical state in response to the plunger being moved between the first and second positions to indicate that the key has been operated by the user.

Ely describes a photo-optical switch apparatus including a photopolymerized matrix of horizontal and vertical intersecting light channels or guides, monolithically formed by exposure to ultraviolet light on a flat planar, plastic substrate. Each intersection has a refractive index higher than either the channel or the adjacent substrate area. A light absorbing key pad is arranged adjacent to each intersection to couple light from the channel up into the key pad. A relative loss of light indicates the key being depressed.

Applicant respectfully submits that the combination of Nading and Ely fails to disclose or suggest all of the features of any of the presently pending claims. For example, the combination of Nading and Ely does not disclose or suggest, at least, “wherein the portion of the light guide surface has a higher refractive index than the portion of the non-reflective actuator surface,” as recited in independent claim 37 and the

similar limitations recited in claim 71. Similarly, the combination of Nading and Ely fails to disclose or suggest, at least, “wherein a relative refractive index between materials on either side of the surface is changed by contacting the surface with a non-reflective deformable actuator, which has a lower refractive index than the surface,” as recited in claim 65. The combination of Nading and Ely also fails to disclose or suggest, at least, “the light guide being configured to be contacted at said surface by a deformable actuator having a lower refractive index than said surface,” as recited in claim 76.

Therefore, according to embodiments of the invention, the actuator is made of a material which has an absolute refractive index lower than the refractive index of the light guide (Specification, paragraph 0038). As discussed above, the Office Action acknowledged that Nading fails to disclose or suggest this element of the claims. In fact, the Office Action acknowledged that both Nading and Ely fail to disclose or suggest that the portion of the light guide surface has a higher refractive index than the portion of the actuator surface (Office Action, page 6). The Office Action then asserted that it would have been an obvious matter of design choice to a person of ordinary skill in the art to make the light guide in Ely more reflective than the light absorbing plastic sheet because Applicant has not disclosed that these features provide an advantage, are used for a particular purpose, or solve a stated problem (Office Action, pages 6-7). The Office Action concluded that it would have been an obvious matter of design choice to modify the combination of Nading and Ely to obtain the present invention (Office Action, page

7). Applicants respectfully disagree with the Office Action's conclusion for at least the following reasons.

Contrary to the assertions of the Office Action, it would not have been an obvious matter of design choice to modify the combination of Nading and Ely to obtain the features "wherein the portion of the light guide surface has a higher refractive index than the portion of the non-reflective actuator surface," as recited in independent claim 37 and the similar limitations recited in the other independent claims. Applicants respectfully assert that one of ordinary skill in the art would clearly not be motivated to modify Ely to obtain such features. In fact, Ely appears to teach the exact opposite of the claimed limitation and, therefore, teaches away from the claimed invention.

As provided in MPEP 2145(X)(D), a prior art reference that "teaches away" from the claimed invention is a significant factor to be considered in determining obviousness. In this case, Ely describes a light absorbing plastic sheet 52 (*e.g.*, an actuator) with an index of refraction equal to or greater than that of a light conducting channel 50 (*e.g.*, a light guide) (Ely, column 4, lines 45-49). When the sheet 52 contacts the channel 50, the light 54 is coupled out of the channel 50 and up into the sheet 52 to be totally or substantially totally absorbed, thus, producing a switch device that is either on or off and provides no intermediate values of light (*see* Ely at column 4, lines 51-56).

Accordingly, Ely discloses that the light conducting channel has a refractive index that is **lower** than or equal to the light absorbing sheet ("light absorbing plastic sheet 52... with an index of refraction... equal to or greater than that of the light

conducting channel 50” (Ely, column 4, lines 45-50). This is to fulfill Ely’s purpose of the light being totally absorbed producing a switch device that is either on or off. Applicants submit that this disclosure of Ely is contrary to elements of the claimed invention and clearly teaches away from the claimed invention.

More specifically, in direct contrast to Ely, embodiments of the present invention provide a light guide surface having a **higher** refractive index than a contacted portion of an actuator surface. As such, according to embodiments of the present invention, internal reflection still occurs within the light guide when the actuator surface contacts the light guide surface (*see, e.g.*, Specification at Figure 3). In addition, since the refractive index of the actuator surface is different than the refractive index of a gas or a fluid between the light guide and the actuator, the amount of light internally reflected will change in a variable manner and provide a range of values of light (*see, e.g.*, independent claim 37). This clearly contrasts with the sheet and the channel of Ely that produce only a switch device that is either on or off and provides no range of values of light (*see* Ely at column 4, lines 51-56). Accordingly, Ely clearly teaches away from the present invention, and a person of skill in the art would not be motivated to modify Ely to obtain the features “wherein the portion of the light guide surface has a higher refractive index than the portion of the non-reflective actuator surface,” as recited in independent claim 37 and similarly recited in the other independent claims.

Furthermore, it would not have been an obvious matter of design choice to modify the combination of Nading and Ely to obtain the features of the claimed invention

because such a modification would render Ely unsatisfactory for its intended purpose. Under MPEP 2143.01(V), if proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.

In this case, as discussed above, the intended purpose of Ely is to totally or substantially totally absorb light when the sheet contacts the channel, thus, producing the switch device (*see* Ely at column 4, lines 51-56). This is accomplished by the actuator with an index of refraction equal to or greater than the light guide (*see* Ely at column 4, lines 45-49). However, if Ely is modified to include the actuator having a lesser refractive index than the light guide, as claimed in the present invention, then light would be totally internally reflected within the channel (*see* Ely at column 4, lines 49-51). This would render the system of Ely unsatisfactory for its intended purpose of producing the switch device. Accordingly, there is no motivation to modify Ely to obtain the features “wherein the portion of the light guide surface has a higher refractive index than the portion of the non-reflective actuator surface,” as recited in independent claim 37 and similarly recited in the other independent claims.

Furthermore, contrary to the assertions of the Office Action, Applicant has disclosed that these features provide an advantage or are used for a particular purpose. As mentioned above, the present invention includes the advantage of being able to change the amount of light internally reflected in a variable manner and to provide a range of values of light (*see, e.g.,* independent claim 37). This advantage cannot be

achieved with the sheet and the channel of Ely that produce only a switch device that is either on or off and provides no range of values of light (*see* Ely at column 4, lines 51-56). Accordingly, Applicants respectfully assert that the Office Action's conclusion that it would have been an obvious matter of design choice to modify the combination of Nading and Ely to obtain the features "wherein the portion of the light guide surface has a higher refractive index than the portion of the non-reflective actuator surface," is clearly erroneous.

Thus, for at least the reasons discussed above, the combination of Nading and Ely does not disclose or suggest, at least, "wherein the portion of the light guide surface has a higher refractive index than the portion of the non-reflective actuator surface," as recited in independent claim 37 and the similar limitations recited in claim 71. Similarly, the combination of Nading and Ely fails to disclose or suggest, at least, "wherein a relative refractive index between materials on either side of the surface is changed by contacting the surface with a non-reflective deformable actuator, which has a lower refractive index than the surface," as recited in claim 65. The combination of Nading and Ely also fails to disclose or suggest, at least, "the light guide being configured to be contacted at said surface by a deformable actuator having a lower refractive index than said surface," as recited in claim 76. Accordingly, Applicant respectfully requests that the rejection of independent claims 37, 65, 71, and 76 be withdrawn.

Claims 38-46, 48, 52-60, 63-64, 68-70, and 72-75 are dependent upon, and further limit, independent claims 37 and 65. Thus, claims 38-46, 48, 52-60, 63-64, 68-70, and

72-75 should be allowed for at least their dependence upon claims 37 and 65, and for the specific limitations recited therein.

Claim 47 was rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Nading and Ely in view of Ochiai (U.S. Patent No. 6,196,691). The Office Action took the position that the combination of Nading and Ely discloses or suggests all of the features of this claim, except for a light guide that includes an optical grating. The Office Action then cited Ochiai to cure the deficiencies of the combination of Nading and Ely. Applicant respectfully submits that this claim recites subject matter that is neither disclosed nor suggested in the combination of Nading, Ely, and Ochiai.

Nading and Ely are outlined above. Ochiai describes rays of light from three light-emitting diodes incident at a thicker side end edge of a light guide plate made of a transparent plate. A ratio of grating part width/non-grating part width in a unit width of a diffraction grating provided on a rear surface of the light guide plate is varied. Grating constant of a diffraction grating of a front surface provided perpendicularly to the diffraction grating, is set to a fixed value smaller than a mean grating constant of the diffraction grating of the rear surface.

Applicant respectfully submits that claim 47 recites subject matter that is neither disclosed nor suggested in the combination of Nading, Ely, and Ochiai. Claim 47 is dependent upon, and further limits, claim 37. As discussed above, the combination of Nading and Ely fails to disclose or suggest all of the features of claim 37. In addition, Ochiai does not cure the deficiencies of the combination of Nading and Ely, as Ochiai

also fails to disclose or suggest, at least, “wherein the portion of the light guide surface has a higher refractive index than the portion of the actuator surface,” as recited in claim 37. Accordingly, Applicant respectfully submits that the combination of Nading, Ely, and Ochiai does not disclose or suggest all of the features of claim 47.

Claims 49-50 were rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Nading and Ely in view of Wingett (U.S. Patent Appln. Pub. No. 2002/0061735). The Office Action took the position that the combination of Nading, Ely, and Wingett discloses or suggests all of the features of these claims. Applicant respectfully submits that each of these claims recites subject matter that is neither disclosed nor suggested in the combination of Nading, Ely, and Wingett.

Nading and Ely are outlined above. Wingett describes a control device for an electronic apparatus, such as a mobile telephone handset, including a keymat having a navigation key with a magnet mounted so as to move with the key. A user may change the attitude of the key by tilting or deforming the key, and at least one magnetic field sensor detects the attitude of the key. This may be used to control a pointer displayed on a screen.

Applicant respectfully submits that claims 49-50 recites subject matter that is neither disclosed nor suggested in the combination of Nading, Ely, and Wingett. Claims 49-50 are dependent upon, and further limit, claim 37. As discussed above, the combination of Nading and Ely fails to disclose or suggest all of the features of claim 37. In addition, Wingett does not cure the deficiencies of the combination of Nading and Ely,

as Wingett also fails to disclose or suggest, at least, “wherein the portion of the light guide surface has a higher refractive index than the portion of the actuator surface,” as recited in claim 37. Accordingly, Applicant respectfully submits that the combination of Nading, Ely, and Wingett does not disclose or suggest all of the features of claims 49-50.

For at least the reasons discussed above, Applicant respectfully submits that the cited references fail to disclose or suggest all of the features of the present invention. These distinctions are more than sufficient to render the present invention unobvious. It is thus respectfully requested that all of claims 37-50, 52-60, 63-65, and 68-76 be allowed, and that this application be passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the applicant's undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, the applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,

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